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ABSTRACT

A system-level analysis of the effectiveness of special education was conducted in an educational cooperative comprised of six school districts. In total, 96 students (grades 1-6) were assessed three times during the year on direct, curriculum-based measures of achievement in math, reading, and spelling. Analyses of student performance data were conducted across the entire cooperative for each district, by teacher, and finally by classification, grade, and sex of student. In contrast to previous findings, the data indicated that special education had a positive effect on student achievement and resulted in performance levels closer to those attained by regular education students. The benefits of such a data-based assessment approach include a measurement alternative for the student as well as a comprehensive reviewing procedure for the needs and problems of the school system. (Author/CL)

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Research Report No. 123

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Research Report No. 123

# THE EFFECTIVENESS OF SPECIAL EDUCATION: A DIRECT MEASUREMENT APPROACH

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June, 1983

Abstract

A system-level analysis of the effectiveness of special education was conducted in an educational cooperative comprised of six school districts. In total, 96 students in grades 1-6 were assessed three times during the year on direct, curriculum-based measures of achievement in reading, math, and spelling. Analyses of student performance data were conducted across the entire cooperative (across all six districts), for each district, by teacher, and finally by classification, grade, and sex of student. In contrast to many of the previous findings in the literature, the data indicated that special education had a positive effect on student achievement and resulted in performance levels closer to those attained by regular education students. The implications of these findings are discussed in terms of the measurement systems used to document effects.

The Effectiveness of Special Education:

A Direct Measurement Approach

The effectiveness of special education placement for handicapped children currently is being challenged. After a thorough review of the literature, Blatt and Garfunkel (1973) could make no conclusive statement that special class placements were preferable to regular class placements for exceptional children. In a more recent review of the research, Carlberg and Kavale (1980) concurred, and suggested that empirical data supporting special placement of educable mentally retarded (EMR), slow learning (SL), behaviorally disordered (BD), and learning disabled (LD) children often are contradictory. Because most previous reviews utilized a narrative approach and/or box-score analyses, both of which lead to rather subjective and incomplete results, these investigators conducted a meta-analysis (Glass, 1976, 1978) of the available data in an attempt to find objective and relevant trends. Focusing on the data gathered in 50 experimental studies, their meta-analysis of Effect Sizes (ES) indicated that, overall, special class placement was inferior to regular class piacement in improving student achievement. Further analysis showed differential effects for various categories of exceptionality. LD and BD placed in special education surpassed their counterparts enrolled in regular education on achievement measures. However, the achievement of EMR and SL children placed in special classes was inferior to those students with a similar diagnosis but educated in the regular class.

The Carlberg and Kavale (1980) conclusions are problematic on three accounts. First, student achievement outcomes in the 50 studies

typically were measured with standardized achievement tests. Often, with these types of tests, the content of the curriculum and the achievement measures do not overlap. Therefore, student learning in the curriculum and measurement of progress are both compromised (Eaton & Lovitt, 1972; Jenkins & Pany, 1978). To the extent that the achievement measures fail to represent real student improvement in areas where remediation has been implemented, the internal validity of the meta-analysis is threatened (Campbell & Stanley, 1963).

A second inadequacy of the Carlberg and Kavale study is the over-reliance on Effect Sizes derived from tests with questionable reliability and validity. These authors cited 30 of the original 50 studies as providing Effect Sizes for the achievement outcome variable. We were able to review 21 of these 30 studies and found that five of the studies used the ITPA or perceptual-motor tests as the dependent variable for measuring achievement, a practice that has been severely challenged (Arter & Jenkins, 1977; Hammill & Larsen, 1974a, 1974b). Student achievement in 10 of the 21 studies was assessed with the Wide Range Achievement Test, a test that has not been adequately standardized and contains a limited behavior sample (Salvia & Ysseldyke, 1981). This extreme dependence on tests with questionable technical adequacy seriously threatens the validity of the meta-analysis.

A third difficulty relates to the inability of norm-referenced tests to measure student learning (Carver, 1974). Hively and Reynolds (1975) remarked that only a criterion or domain-referenced assessment procedure adequately measures pupil progress. Since norm-referenced

tests are designed to measure individual differences and not improvement, it may be argued that the Carlberg and Kavale (1980) meta-analysis, based upon norm-referenced achievement tests, is misleading.

In summary, the questionable nature of the dependent variables used in the meta-analysis threatens the validity of the statements made concerning the efficacy of special education. What is needed to measure the outcomes of (special) educational interventions is a sensitive and relevant measurement system, such as direct measures of student achievement using curriculum-based assessment procedures (Deno, & Mirkin, 1977; Haring & Lovitt, 1969; Howell, Kaplan, & O'Connell, 1979; Lovitt, 1976; White & Haring, 1980). If our task is to measure the effectiveness of special education programs, it is imperative that the measures be specifically designed to measure pupil progress in the classroom. Deno and his associates have demonstrated the validity of such measures in reading (Deno, Mirkin, & Chiang, 1982), spelling (Deno, Mirkin, Lowry, & Kuehnle, 1980), and written expression (Deno, Marston, & Mirkin, 1982). Research in the area of math has determined that similar procedures have adequate reliability (Tindal, Marston, & Deno, 1983), although further research needs to be conducted to establish criterion-related validity. The research presented here is a study of the degree to which students receiving special services improve when assessed with curriculum-based, direct measures. It is our view that this alternative evaluation strategy may improve upon past analyses of the effectiveness of special education.

## Method

### Subjects

This research was conducted as a part of the educational system implemented in Pine County, which has adopted a delivery of services based on the model developed by Deno and Mirkin (1977). A total of 96 special education students served as subjects for this research project. There were 15 girls and 81 boys in grades 1-6. All students had been referred and found eligible for special education services at the beginning of the school year. The students' primary handicapping classification was either learning disabled or educable mentally retarded. Fifty-five of the students received services in learning disability programs and 41 pupils were in EMR programs. All students were being served through an educational cooperative comprised of six school districts. Because this cooperative provided a common administrative organization, the same assessment, measurement, and evaluation procedures were used for all students in this research.

### Materials

As previously mentioned, the measurement system adopted by the the special educational cooperative for all educational decisions was based on the work of Deno and his colleagues. Initially developed for purposes of planning and evaluating instructional programs (cf. Deno & Mirkin, 1977), the emphasis of measurement was on direct and frequent assessment of student progress.

The measures consisted of brief samples (from one to three minutes) of student performance using the curriculum as the source of items for testing. Because of the low numbers of students served in

the area of written expression (n=7), the results from this area were eliminated from all analyses. Following is a brief description of the measures in reading, spelling, and mathematics.

(a) The reading measure consisted of a one-minute sample of oral reading, utilizing a count of the number of words read correct and incorrect.

(b) The spelling measure consisted of a two minute sample of spelling in response to a dictated word list, utilizing a count of the number of words and letter sequences spelled correct and incorrect.

(c) The math measure consisted of a two-minute sample of computation of math problems, utilizing the number of digits computed correct and incorrect, including those involved in the steps prerequisite to solving the problem.

All of the measurement materials were developed from the curricula in use in the school districts. For reading and spelling, the passages and word lists were sampled from the curriculum used in the regular education program in each district and represented grade appropriate material. For the math measure, the problems were sampled from a compilation of problems from all six districts' regular education curricula.

Procedures

All special students were tested at three times during the school year: (a) in the fall, at the point of referral and determination of eligibility; (b) in the winter, at the midpoint of the school year, and (c) in the spring, at the end of the year. Only those students referred, assessed, and found eligible by the time of the state's child count of handicapped students (December 1) were included in the analysis.

A comparable testing schedule was conducted with a random sample of regular education students in each of the districts. This provided a normative reference with which to compare special education students' performance; this was used in determining eligibility and improvement. A total of 660 students were involved in this testing, with approximately 20 students from each grade within each district (two smaller districts included only 15 students per grade). The same measurement materials and procedures were used for this group.

In analyses conducted on the special education population, two indices of performance were calculated: (a) the absolute score for each of the academic areas (reading, spelling, and math), and (b) the degree of improvement relative to regular education performance, known as a discrepancy index. This latter measure was calculated for each grade level by dividing the lower performance score (typically from the special education students) into the higher performance (typically from the regular education students). For example, if a student referred for special education read 50 words per minute during the assessment while his/her grade-appropriate peers had read 100 words per minute, the former student would show a 2.0 discrepancy (100/50) and possibly be found eligible for special education services. If, at the end of the year, the two scores were 100 and 140, respectively, the discrepancy index would have dropped (improved) to 1.4.

Because of the relatively small number of students involved in this research, a breakdown analysis was not possible. Rather, an aggregate analysis was conducted by regrouping students over the following major educational variables: the cooperative (all six

districts) and each school district, teacher, student classification, grade, and sex. The data for the last four variables were analyzed for statistically significant differences between the various levels of each variable (factor). Only at the level of the school district were significance tests not conducted. Of course, at the highest aggregation, the cooperative, there was only one level, precluding the use of statistical tests.

## Results

An analysis of the performance of all special education students on the reading (passages and word lists), mathematics (addition, subtraction, multiplication, and division), and spelling measures is presented in Table 1. In addition to the average median correct and standard deviations for these measures, the average discrepancy and its standard deviation are included in the table for each testing (fall, winter, and spring). For example, in the fall the average number of words read correctly from passages by a student receiving special education services was 36.0, which is 5.0 times discrepant from peers. Comparisons across time showed that the performance of the special education students increased at each testing on all sever measures, thus demonstrating academic growth. In most cases, the growth was fairly consistent aross the three testing periods. However, in addition and subtraction, most of the improvement attained by the end of the year had been accomplished between the fall and winter testings, with little real improvement shown between the winter and spring testing. Concurrently, the discrepancy ratios were reduced in each academic category between fall and spring test sessions,

signifying that the special education students were making progress and performing more at a level commensurate with regular education peers. However, in five areas, the improvement was not consistent over the year. In reading passages, the improvement made in the first semester was not sustained and may have actually deteriorated in the second semester. In addition, subtraction, and spelling, most improvement occurred during the first semester only. In division, the discrepancy of special education students actually became much worse from fall to winter testing, with a very marked change occurring from winter to spring, resulting in an overall reduction in discrepancy.

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Insert Table 1 about here

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School District

Means and standard deviations across the six districts participating in the study are reported in Tables 2-8. Inspection of the data reveals that in all but one of the districts with complete data there was an increase in the average medians in the two types of reading data (passages and lists) from fall to winter to spring (see Tables 2 and 3). Only district B showed a lack of improvement following the initial gains made from fall to winter. In 29 out of 32 instances, the discrepancy ratio was reduced between fall and spring. In one district, the discrepancy ratio increased by year's end, while one district showed no overall change on the reading passages.

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Insert Tables 2-8 about here

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In the area of mathematics (see Tables 4-7), all districts showed an overall gain from fall to spring in the average median digits correct. However, several had the greatest improvement occur from fall to winter, and then showed no further improvement or actually showed losses. This lack of change, though, was less than the net gain from the earlier period. In addition, subtraction, and multiplication, 50% of the districts exhibited this pattern. Considerably different results are found for the discrepancy data. Of the 72 data points (six districts, three testing periods, and four math operations), there were 22 scores that represented losses from the previous testing levels, 8 of which resulted in a total decrease from fall to spring - that is, the discrepancy was actually higher at year's end than at the beginning. Approximately 33% of the math discrepancy results showed this negative effect. In the area of spelling, the four districts that served students showed improvement from fall to spring on both the average median correct letter sequences as well as the discrepancy ratios.

Teacher

The results from analyses by teacher are presented in Tables 9-17. Results of the tests of significance among teachers are summarized in Table 9. Means and standard deviations of students' performance in the three academic areas are detailed in Tables 10-16. The data revealed considerable variation among teachers for changes in

both the average median correct and the average discrepancy ratios in all of the academic areas.

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Insert Tables 9-17 about here

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Tests of significance conducted on the average median correct and the average discrepancy revealed an inconsistent pattern of significant differences among teachers (see Table 9). In the average median correct for reading passages, significant differences were found at all three testing periods. Only in the fall, however, were there significant differences among teachers for reading passage discrepancies. With word lists, significant differences appeared only in the average median correct for the winter testing and the average discrepancy for the spring testing. In the area of math, teachers appeared significantly different during the fall testing in the average median correct for subtraction and the average discrepancy for addition and division; during the winter testing, only in the average median correct for multiplication and division were there significant differences among teachers; during the spring testing, differences appeared in the average median correct for division only. In spelling, there was one significant difference among teachers in the fall discrepancies.

The above results are similar to those obtained in the analysis by district. In part, this is explained by the fact that for three districts, there was only one teacher per district, resulting in duplication of data at both levels.

Inspection of Tables 10-16 reveals several findings concerning the improvement of student performance across the three testing periods. In reading passages (see Table 10), all teachers showed improved student performance on the average median correct. On discrepancies, 6 of 10 teachers showed overall improvements, three showed equivalent results (within one decimal point) between fall and spring and one showed a decrease in the students' standing relative to peers. Most improvement occurred between fall and winter testing, with the students of seven teachers showing losses between winter and spring or showing no gain during the period.

On word lists (see Table 11), the results were quite similar. All teachers showed overall improvements from fall to spring on the average median correct, though for two teachers, this improvement occurred between the first two testing periods. On the discrepancies, 8 of 10 teachers showed overall improvements while one teacher had a larger average discrepancy in the spring than in the fall and one had essentially similar average discrepanies.

In the area of mathematics (see Tables 12-15), there was overall improvement from fall to spring in the average median correct for all teachers in both addition and multiplication. In division, one teachers' students performed lower in the spring than they did in the fall, while in subtraction, one teacher's students had lower correct performance and two teachers' students had similar performance (within one unit) in the spring as compared to the fall. As was previously noted, most improvements occurred from fall to winter. This was true for over 50% of the teachers in all areas of math except division.

For the discrepancies in math, most teachers showed an overall improvement in their students' relative standing from fall to spring: 6 of 9 in addition; 8 of 10 in subtraction; and 5 of 9 in multiplication. Only in division did the majority of teachers show decreased standings of students served in special education relative to regular education peers (5 of 9). In all areas of math, most improvements in discrepancies from peers occurred in the first semester. It is interesting also to note that one teacher showed increases (worsening) in the discrepancy ratio for all areas of math, one teacher showed increases in three of four areas, and three showed discrepancy increases in two of the four areas.

In the area of spelling (see Table 16), all five teachers showed student improvements in the average median correct from fall to winter to spring. In the discrepancies, four of the five showed improvements, while one teacher showed a slight decrement in the average discrepancy.

In summary, as can be seen in Table 17, the average discrepancies for students of three teachers were reduced between fall and spring across all areas in which data were obtained (6 of 6). However, for four other teachers the students' average discrepancy actually increased in approximately 30% of the academic measures, while for two teachers, increased discrepancies occurred in all of the areas served. It should be pointed out that, for these teachers, average median performance did increase across time, but did not increase proportionately to peer improvement.

Student Classification

Data also were summarized as a function of student classification. The results from the significance tests and the means and standard deviations for reading, math, and spelling are presented in Tables 18-21. Examination of the data indicates a significantly higher level of academic performance during the fall testing for LD students than for EMR students on the passage measure of reading and the measures of addition and division. During the winter testing, only the passages in reading and subtraction in math showed significant differences between LD and EMR students in the average median correct. Finally, in the spring, significant differences appeared for all but two math measures (subtraction and division) and spelling. Significant differences appeared between the two groups in discrepancy ratios in reading passages, addition, and spelling in the fall; in addition and subtraction in the winter; and in addition and multiplication in the spring. Both the median correct and the peer discrepancy ratio for all students showed improvements between fall and spring on all measures in reading, spelling, and math, except for discrepancies of EMR students in division and LD students on reading passages and spelling.

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Insert Tables 18-21 about here

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Closer inspection reveals interesting differences between LD and EMR students. While the two groups of students showed similar improvement on both reading measures in average median correct from

fall to winter, EMR students showed little improvement in performance from winter to spring (see Table 19). For both groups, most reduction in discrepancies occurred from the fall to winter, though a much greater amount appeared for the EMR students.

In math, EMR students showed little improvement in the second semester [illegible]ther the average median correct or the discrepancies in addition, and the median correct in multiplication, while LD students showed a similar lack of improvement for the same time frame in subtraction for both of these indices and in addition for discrepancies (see Table 20). In multiplication, although EMR students showed little improvement in the median correct, there was a substantial reduction in the discrepancy ratios. In division, although LD students showed an overall improvement in discrepancies, this occurred only following an increase in the first semester.

In spelling, students in both classifications showed considerable improvements in the median correct (see Table 21). However, only EMR students showed a large decrease in the discrepancy from peers, with all of this gain occurring in the first semester.

Grade Level

Performance by grade level is presented in Tables 22-29. Significant differences were found among grades for both average median correct and discrepancies only in reading passages at all three testing periods (see Table 22). In reading word lists and spelling, significant differences occurred in the average median correct for all testing periods. However, with discrepancies, differences were significant only in the fall in spelling and only in the spring in

reading word lists. Very few differences were found in all four areas of math. Significant differences among grades in the average median correct occurred in the fall for addition, subtraction, and multiplication, and in the spring for multiplication only. Significant differences among grades also were found in addition and subtraction in the discrepancies, in the fall for the former and in the winter for the latter. The only significant difference among grades in division occurred in the average discrepancy at the spring testing.

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Insert Tables 22-29 about here

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Although improvements occurred within all grades between testing periods in the average median correct in reading passages, only four grades showed concomitant decreases in discrepancies (see Table 23). Most of the improvements in discrepancies occurred from fall to winter for all six grades. The findings for word lists (see Table 24) showed less consistent improvement in the average median correct across the three testing periods, though an overall improvement for all grades was found. Only one grade showed an increase in the discrepancy from fall to spring for the word lists in reading.

In math, there was an increase in the average median correct from fall to spring for all grades and in all functions except grade three in subtraction (see Tables 25-28). However, there were several grades where the discrepancy increased across the three testing periods, with about one third showing an overall negative net effect.

In spelling, there was an improvement in the average median correct for all five grades (see Table 29). In four of the five grades, the average discrepancy showed improvement from fall to spring.

Student Sex

The final analysis conducted was on sex of student for both the average median correct and the average discrepancy (see Table 30). Differences between girls and boys were found to be significant for the average median correct on word lists in the fall and in discrepancy ratios in division in the winter. In all other areas and testing periods, no significant differences were found.

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Insert Table 30 about here

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In an analysis of improvement within measures across testing periods, very consistent findings occurred for all academic measures in the average median correct (see Tables 31-33). For the average discrepancies, improvements occurred in every area except reading for girls. On both measures of reading, girls were more discrepant in the spring than they were in the fall. Although improvements were shown in the average median correct in subtraction, little change occurred for girls in the discrepancies from fall to spring testing.

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Insert Tables 31-33 about here

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## Discussion

The results of this study indicate two trends occurring in the special education cooperative where a data-based assessment model has been adopted. First, it is clear that those students receiving either LD or EMR services are improving in achievement level, as measured by curriculum-based, direct measures of academic performance. The assessment of growth on objective, observable behaviors cannot be minimized for it represents actual learning of functional skills necessary to all children in our society. The methodology used to measure educational effects is closely related to the domain-referenced model proposed by Hively and Reynolds (1975) and indicates that within-child learning can be assessed without norm-referenced tests.

Second, the results indicate that the direct measurement data also may be used in a norm-referenced fashion, such as with peer discrepancy scores. The discrepancy analysis is significant in considering the effectiveness of special education. If special education is not effective in remediating student learning problems, one would expect peer discrepancy ratios to remain constant across time, or to increase. However, the data presented here suggest otherwise. In most cases, LD and EMR students decreased the discrepancy between themselves and peers during the academic school year. These data support the use of special education services for intervening with elementary students with exceptional needs. It should be considered also for handicapped secondary students; there is a notable absence of research in assessment for these students

(Miller, 1981). The significance of this research lies in the measurement system itself, in providing a sensitive measure of achievement. Unlike previous research which utilized either inadequate published measures of achievement, or worse yet, rating scales, the current findings are based on reliable and valid measures of achievement.

Several cautions, however, need to be stated in the interpretations which can be made from this research. In some of the analyses, the number of students in the analysis (i.e. on the teachers' case load) was quite few (less than three). Additionally, the standard deviations for both the average median correct and the average discrepancy in many analyses was quite large, relative to the average itself. The net effect of this is the potential for a measure of central tendency to be quite unstable. For this reason, the data should not be over-interpreted and taken out of context.

In addition, although statistical tests were conducted on the major variables (teacher, classification, grade, and sex of student), no tests of significance were conducted on the change across testing periods. Due to the problems involved in basing formal analyses on gain scores (i.e., reliability of the difference score) and regression to the mean, these tests were deemed inappropriate. Rather, the analysis was based on the use of three testing periods. Statements of effects were based on improvements between the testing periods. To the degree that effects were noted without corroborating tests of significance, however, the interpretations should be viewed tentatively. An interesting finding, which occurred quite

consistently for many of the analyses, was the differential growth over the course of the year. Most improvements appeared to occur during the first semester (from fall to winter) and less often during the second semester (from winter to spring).

The structure of the data-based assessment approach used in this research provides important collateral side effects. Most significant is the research base that has been developed in this educational cooperative. Watson (1971) stated that "a major reason that 'mindlessness' continues to characterize school systems is that they fail to recognize the critical need for research [p. 349]." The data-based approach can supply this research component. Note also that the research is not specific to the special education system, but draws in the regular education component as well. This practice should facilitate educational change (Lilly, 1973). Thus, the school administrator has a mechanism that he or she may call upon for decision-making purposes. For example, the individual analysis of teacher efficacy presented indicates that while some teachers appear effective, other teachers are having problems. This is not to be seen as a means to identify poor teachers, but rather poor teaching environments. Such an analysis may lead to an awareness that components of that environment have been neglected (e.g., budget for curriculum, deteriorating physical environment, high student-teacher ratio). In total, then, the data-based assessment approach offers not only a measurement alternative for the student, but a comprehensive reviewing procedure that is sensitive to the needs and problems of the school system.

While the data should not be over-interpreted, the value of this measurement system cannot be understated. The same data base can be used at the IEP level to evaluate individual student programs, as well as at a systems level to evaluate major administrative variables and provide an empirical basis for change. The importance of this research lies not in the fact that special education services appeared to be effective, but that it was systematically documented at all, and in the context of an ongoing school system.

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Footnote

Gerald Tindal also is affiliated with the University of Minnesota Institute for Research on Learning Disabilities.

Table 1

Means and Standard Deviations of Number Correct and Discrepancies on Measures of Reading, Math, and Spelling for the Entire Cooperative[a]

| | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation-Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| Reading: | | | | | |
| Passages | 96 | 36.0 | 29.3 | -5.0 | 7.1 |
| Word Lists | 59 | 9.5 | 9.5 | -5.9 | 5.3 |
| Math: | | | | | |
| Addition | 35 | 10.7 | 9.8 | -2.0 | 3.2 |
| Subtraction | 53 | 7.2 | 8.4 | -3.1 | 3.5 |
| Multiplication | 41 | 9.7 | 7.3 | -6.0 | 10.0 |
| Division | 35 | 1.9 | 2.7 | -6.0 | 5.6 |
| Spelling | 30 | 36.9 | 25.0 | -6.8 | 11.3 |
| Winter Testing | | | | | |
| Reading: | | | | | |
| Passages | 96 | 48.4 | 27.7 | -3.2 | 3.0 |
| Word Lists | 96 | 15.4 | 12.0 | -5.3 | 4.7 |
| Math: | | | | | |
| Addition | 37 | 20.8 | 10.7 | -1.2 | 1.4 |
| Subtraction | 50 | 14.6 | 7.6 | -2.0 | 1.9 |
| Multiplication | 45 | 20.1 | 13.6 | -3.5 | 7.0 |
| Division | 40 | 6.9 | 10.1 | -10.1 | 11.9 |
| Spelling | 28 | 71.7 | 29.1 | -2.0 | 0.7 |
| Spring Testing | | | | | |
| Reading: | | | | | |
| Passages | 96 | 52.6 | 29.8 | -3.6 | 4.1 |
| Word Lists | 96 | 18.8 | 12.9 | -5.0 | 6.7 |
| Math: | | | | | |
| Addition | 35 | 21.9 | 10.8 | -1.3 | 1.5 |
| Subtraction | 53 | 14.9 | 7.2 | -1.9 | 1.9 |
| Multiplication | 41 | 27.3 | 17.8 | -2.8 | 4.7 |
| Division | 35 | 13.1 | 12.6 | -4.9 | 7.9 |
| Spelling | 30 | 83.3 | 31.7 | -2.0 | 0.7 |

[a]No tests of significance were conducted.

Table 2

Means and Standard Deviations of Number Correct and Discrepancies in Reading Passages for Each District[a]

| District | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| A | 4 | 28.0 | 21.8 | -7.6 | 7.7 |
| B | 21 | 17.3 | 15.3 | -7.2 | 9.7 |
| C | 16 | 33.9 | 22.4 | -3.3 | 3.1 |
| D | 11 | 49.0 | 33.6 | -2.7 | 1.7 |
| E | 13 | 25.5 | 26.7 | -10.3 | 11.6 |
| F | 31 | 50.3 | 32.1 | -2.7 | 2.2 |
| Winter Testing | | | | | |
| A | 4 | 46.8 | 23.5 | -2.9 | 1.3 |
| B | 21 | 33.0 | 19.5 | -4.3 | 3.3 |
| C | 16 | 50.3 | 25.3 | -2.6 | 1.5 |
| D | 11 | 53.9 | 28.1 | -3.6 | 2.8 |
| E | 13 | 32.9 | 20.2 | -4.8 | 5.3 |
| F | 31 | 62.7 | 29.8 | -2.2 | 1.6 |
| Spring Testing | | | | | |
| A | 4 | 49.5 | 32.5 | -2.1 | 2.1 |
| B | 21 | 41.7 | 24.3 | -5.1 | 6.7 |
| C | 16 | 53.6 | 27.3 | -3.0 | 1.8 |
| D | 11 | 61.4 | 34.4 | -2.7 | 1.3 |
| E | 13 | 33.7 | 18.4 | -4.2 | 2.4 |
| F | 31 | 64.6 | 31.5 | -3.3 | 4.1 |

[a]No tests of significance were conducted.

Table 3

Means and Standard Deviations of Number Correct and Discrepancies in Reading Word Lists for Each District[a]

| District | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| A | 4 | 5.5 | 4.2 | -10.4 | 8.1 |
| B | 20 | 8.6 | 10.5 | -6.8 | 5.8 |
| C | 16 | 9.8 | 9.8 | -5.1 | 5.4 |
| D | 11 | 14.8 | 11.0 | -5.1 | 3.9 |
| E | -- | -- | -- | -- | -- |
| F | 8 | 6.8 | 3.2 | -4.2 | 3.2 |
| Winter Testing | | | | | |
| A | -- | -- | -- | -- | -- |
| B | 21 | 14.7 | 11.8 | -5.7 | 4.8 |
| C | 16 | 17.4 | 14.8 | -5.3 | 4.7 |
| D | 11 | 19.4 | 10.0 | -3.9 | 2.2 |
| E | -- | -- | -- | -- | -- |
| F | 31 | 8.0 | 6.1 | -6.2 | 6.8 |
| Spring Testing | | | | | |
| A | 4 | 17.3 | 12.1 | -3.7 | 2.2 |
| B | 21 | 13.4 | 7.7 | -4.7 | 3.4 |
| C | 15 | 21.0 | 14.2 | -4.1 | 2.6 |
| D | 11 | 22.5 | 11.7 | -4.0 | 2.3 |
| E | -- | -- | -- | -- | -- |
| F | 31 | 22.6 | 15.6 | -6.1 | 11.0 |

[a]No tests of significance were conducted.

Table 4

Means and Standard Deviations of Number Correct and Discrepancies in Addition for each District[a]

| District | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| A | 2 | 6.5 | 0.7 | -4.0 | 0.4 |
| B | 7 | 4.9 | 2.7 | -3.7 | 2.1 |
| C | 10 | 21.2 | 12.4 | +1.2 | 1.8 |
| D | 8 | 8.0 | 6.7 | -3.2 | 3.3 |
| E | 1 | 7.0 | -- | -3.6 | -- |
| F | 8 | 14.0 | 14.1 | -0.8 | 4.6 |
| Winter Testing | | | | | |
| A | 2 | 23.0 | 0.0 | -1.0 | 0.0 |
| B | 7 | 19.0 | 11.8 | -1.3 | 1.6 |
| C | 7 | 18.6 | 7.0 | -0.8 | 1.4 |
| D | 7 | 19.7 | 11.4 | -1.0 | 1.6 |
| E | 1 | 20.0 | 0.0 | -1.7 | 0.0 |
| F | 8 | 25.6 | 15.1 | -1.5 | 1.3 |
| Spring Testing | | | | | |
| A | 2 | 22.5 | 0.7 | -1.5 | -- |
| B | 7 | 17.6 | 10.3 | -2.0 | 1.9 |
| C | 8 | 25.8 | 7.9 | -0.9 | 1.2 |
| D | 8 | 22.4 | 12.1 | -1.1 | 1.8 |
| E | 1 | 26.0 | -- | -1.5 | -- |
| F | 17 | 20.6 | 10.6 | -1.7 | 1.0 |

[a] No tests of significance were conducted.

Table 5

Means and Standard Deviations of the Number Correct and Discrepancies in Subtraction for Each District[a]

| District | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| A | 2 | 6.5 | 6.4 | -5.9 | 5.8 |
| B | 7 | 3.4 | 3.2 | -2.8 | 0.9 |
| C | 10 | 14.8 | 12.6 | -0.2 | 2.2 |
| D | 8 | 4.3 | 5.0 | -4.1 | 4.6 |
| E | 5 | 5.4 | 2.7 | -5.0 | 2.9 |
| F | 17 | 7.8 | 8.4 | -2.7 | 3.5 |
| Winter Testing | | | | | |
| A | 2 | 10.0 | 1.4 | -2.7 | 0.4 |
| B | 7 | 12.9 | 12.0 | -2.7 | 2.9 |
| C | 7 | 15.7 | 7.0 | -1.0 | 1.5 |
| D | 7 | 10.6 | 5.5 | -2.6 | 1.6 |
| E | 4 | 18.8 | 7.5 | -1.8 | 0.6 |
| F | 21 | 16.1 | 7.4 | -1.9 | 2.1 |
| Spring Testing | | | | | |
| A | 2 | 7.0 | 2.8 | -4.1 | 1.6 |
| B | 7 | 15.9 | 9.5 | -1.3 | 1.8 |
| C | 8 | 16.0 | 9.3 | -1.7 | 2.3 |
| D | 8 | 13.0 | 6.5 | -1.6 | 2.1 |
| E | 5 | 18.0 | 7.6 | -1.7 | 1.8 |
| F | 17 | 14.8 | 6.8 | -2.3 | 2.2 |

[a]No tests of significance were conducted.

Table 6

Means and Standard Deviations of Number Correct and Discrepancies in Multiplication for Each District[a]

| District | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| A | 2 | 3.5 | 3.5 | -23.3 | 23.6 |
| B | 4 | 4.0 | 1.4 | -5.1 | 2.4 |
| C | 6 | 13.7 | 7.0 | -0.6 | 1.7 |
| D | 7 | 7.6 | 7.1 | -3.8 | 4.5 |
| E | 4 | 17.5 | 10.2 | -3.9 | 2.5 |
| F | 14 | 7.3 | 7.0 | -8.8 | 13.3 |
| Winter Testing | | | | | |
| A | 2 | 2.5 | 0.7 | -9.6 | 2.7 |
| B | 4 | 23.8 | 14.1 | -0.9 | 2.7 |
| C | 5 | 29.4 | 19.8 | -2.5 | 3.3 |
| D | 6 | 18.2 | 11.3 | -9.9 | 17.8 |
| E | 3 | 39.3 | 3.2 | -1.3 | 1.0 |
| F | 16 | 20.2 | 11.2 | -2.4 | 2.9 |
| Spring Testing | | | | | |
| A | 2 | 13.0 | 4.2 | 0.0 | 1.8 |
| B | 4 | 11.5 | 8.6 | -6.9 | 4.7 |
| C | 6 | 19.7 | 13.2 | -6.5 | 7.3 |
| D | 7 | 37.7 | 22.3 | -1.6 | 2.8 |
| E | 4 | 26.5 | 17.2 | -2.6 | 1.4 |
| F | 12 | 34.5 | 17.8 | -0.1 | 2.6 |

[a]No tests of significance were conducted.

Table 7

Means and Standard Deviations of Number Correct and Discrepancies in Division for Each District[a]

| District | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| A | 3 | 0.0 | -- | -13.0 | 0.0 |
| B | 4 | 0.0 | 0.0 | -3.8 | 0.9 |
| C | 6 | 2.8 | 2.6 | -0.3 | 4.3 |
| D | 7 | 2.9 | 3.5 | -3.6 | 5.6 |
| E | 4 | 0.8 | 1.5 | -8.3 | 3.3 |
| F | 11 | 2.4 | 2.5 | -7.1 | 5.7 |
| Winter Testing | | | | | |
| A | 3 | 6.7 | 5.5 | -5.5 | 3.3 |
| B | 4 | 5.0 | 2.6 | -4.6 | 3.0 |
| C | 4 | 7.8 | 6.1 | -10.6 | 15.0 |
| D | 6 | 4.2 | 3.3 | -10.2 | 7.0 |
| E | 3 | 37.7 | 15.3 | -0.7 | 1.7 |
| F | 11 | 3.6 | 2.4 | -12.0 | 8.8 |
| Spring Testing | | | | | |
| A | 3 | 10.7 | 10.1 | -3.9 | 7.2 |
| B | 4 | 7.0 | 5.0 | -9.0 | 10.9 |
| C | 6 | 10.8 | 12.4 | -4.8 | 3.8 |
| D | 7 | 5.9 | 6.0 | -11.9 | 11.9 |
| E | 4 | 33.8 | 7.2 | +0.6 | 1.3 |
| F | 12 | 8.4 | 12.6 | -4.7 | 5.5 |

[a]No tests of significance were conducted.

Table 8

Means and Standard Deviations of Number Correct and Discrepancies in Spelling for Four Districts[a]

| District | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| C | 10 | 27.4 | 9.0 | -2.2 | 0.9 |
| E | 9 | 27.1 | 27.8 | -17.1 | 17.0 |
| F | 2 | 58.0 | 17.0 | -2.6 | 0.8 |
| G | 8 | 51.1 | 28.9 | -2.5 | 2.0 |
| Winter Testing | | | | | |
| C | 10 | 82.4 | 21.5 | -1.7 | 0.5 |
| E | 10 | 62.9 | 34.1 | -2.1 | 0.7 |
| F | -- | -- | -- | -- | -- |
| G | 8 | 69.4 | 29.9 | -2.3 | 0.8 |
| Spring Testing | | | | | |
| C | 10 | 91.6 | 29.5 | -2.0 | 0.8 |
| E | 9 | 64.9 | 24.7 | -2.0 | 0.7 |
| F | 2 | 116.5 | 55.9 | -1.8 | 0.8 |
| G | 8 | 83.6 | 32.1 | -1.9 | 0.6 |

[a]No tests of significance were conducted.

Table 9

F-ratios, Degrees of Freedom, and Probability Levels for ANOVA on Teachers

| Measures | Fall | | Winter | | Spring | |
|---|---|---|---|---|---|---|
| | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies |
| Passages | $F = 4.93$ $(8,87)$ $p \leq .001$ | $F = 2.21$ $(8,87)$ $p \leq .05$ | $F = 4.71$ $(8,87)$ $p \leq .001$ | X | $F = 3.53$ $(8,87)$ $p \leq .001$ | X |
| Word Lists | X | X | $F = 5.24$ $(5,50)$ $p \leq .001$ | X | X | $F = 3.08$ $(8,87)$ $p \leq .01$ |
| Addition | X | $F = 5.50$ $(8,26)$ $p \leq .001$ | X | X | X | X |
| Subtraction | $F = 3.24$ $(8,44)$ $p \leq .01$ | X | X | X | X | X |
| Multiplication | X | X | $F = 2.48$ $(7,28)$ $p \leq .05$ | X | X | X |
| Division | X | $F = 3.04$ $(7,27)$ $p \leq .05$ | $F = 13.12$ $(7,23)$ $p \leq .001$ | X | $F = 2.90$ $(7,27)$ $p \leq .05$ | X |
| Spelling | X | $F = 3.42$ $(4,24)$ $p \leq .05$ | X | X | X | X |

Table 10

Means and Standard Deviations of Number Correct and Discrepancies in Reading Passages by Teacher

| Teacher | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 4 | 28.0*** | 21.8 | 7.6* | 7.7 |
| 2 | 7 | 14.1 | 12.8 | -8.9 | 12.5 |
| 3 | 14 | 18.9 | 16.7 | -6.3 | 8.3 |
| 4 | 11 | 49.0 | 33.6 | -2.7 | 1.7 |
| 5 | 13 | 25.5 | 26.7 | -10.3 | 11.6 |
| 6 | 9 | 65.9 | 41.1 | -2.7 | 2.7 |
| 7 | 8 | 23.0 | 17.0 | -3.3 | 3.4 |
| 8 | 9 | 32.1 | 21.6 | -3.2 | 3.6 |
| 9 | 7 | 36.3 | 24.9 | -3.3 | 2.7 |
| 10 | 14 | 55.8 | 22.8 | -2.3 | 0.8 |
| Winter Testing | | | | | |
| 1 | 4 | 46.8*** | 23.5 | -2.9 | 1.3 |
| 2 | 7 | 32.3 | 13.5 | -3.0 | 0.9 |
| 3 | 14 | 33.4 | 22.4 | -5.0 | 3.9 |
| 4 | 11 | 53.9 | 28.1 | -3.6 | 2.8 |
| 5 | 13 | 32.9 | 20.2 | -4.8 | 5.3 |
| 6 | 9 | 72.0 | 36.9 | -1.8 | 1.4 |
| 7 | 8 | 36.8 | 24.8 | -3.2 | 2.7 |
| 8 | 9 | 49.1 | 24.5 | -2.5 | 1.3 |
| 9 | 7 | 51.9 | 28.2 | -2.6 | 1.8 |
| 10 | 14 | 71.5 | 17.9 | -1.8 | 0.5 |
| Spring Testing | | | | | |
| 1 | 4 | 49.5*** | 32.5 | -2.1 | 2.1 |
| 2 | 7 | 49.0 | 24.6 | -2.9 | 1.7 |
| 3 | 14 | 38.1 | 24.3 | -6.2 | 8.1 |
| 4 | 11 | 61.4 | 34.4 | -2.7 | 1.3 |
| 5 | 13 | 33.7 | 18.4 | -4.2 | 2.4 |
| 6 | 9 | 70.6 | 37.3 | -2.7 | 3.0 |
| 7 | 8 | 38.1 | 27.4 | -6.5 | 6.5 |
| 8 | 9 | 52.0 | 24.9 | -2.8 | 1.3 |
| 9 | 7 | 55.6 | 32.1 | -3.2 | 2.4 |
| 10 | 14 | 75.9 | 20.9 | -1.8 | 0.4 |

*$p \leq .05$
***$p \leq .001$

Table 11

Means and Standard Deviations of Number Correct and Discrepancies in Reading Word Lists by Teacher

| Teacher | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 4 | 5.5 | 4.2 | -10.4 | 8.1 |
| 2 | 7 | 13.9 | 15.1 | -3.4 | 2.3 |
| 3 | 13 | 5.7 | 6.0 | -8.6 | 6.3 |
| 4 | 11 | 14.8 | 11.0 | -5.1 | 3.9 |
| 5 | -- | -- | -- | -- | -- |
| 6 | -- | -- | -- | -- | -- |
| 7 | 6 | 6.0 | 3.2 | -4.3 | 3.7 |
| 8 | 9 | 10.4 | 11.2 | -5.7 | 7.0 |
| 9 | 7 | 8.0 | 8.3 | -4.2 | 2.6 |
| 10 | 2 | 9.0 | 2.8 | -4.1 | 1.5 |
| Winter Testing | | | | | |
| 1 | -- | -- | -- | -- | -- |
| 2 | 7 | 27.6*** | 10.2 | -2.0 | 0.8 |
| 3 | 14 | 8.3 | 5.8 | -7.6 | 4.9 |
| 4 | 11 | 19.4 | 10.0 | -3.9 | 2.2 |
| 5 | -- | -- | -- | -- | -- |
| 6 | -- | -- | -- | -- | -- |
| 7 | 8 | 8.0 | 6.1 | -6.2 | 6.8 |
| 8 | 9 | 21.4 | 17.2 | -4.7 | 3.6 |
| 9 | 7 | 12.1 | 9.7 | -6.0 | 6.0 |
| 10 | -- | -- | -- | -- | -- |
| Spring Testing | | | | | |
| 1 | 4 | 17.3 | 12.1 | -3.7** | 2.2 |
| 2 | 7 | 15.7 | 8.1 | -2.9 | 1.2 |
| 3 | 14 | 12.3 | 7.5 | -5.6 | 3.8 |
| 4 | 11 | 22.5 | 11.7 | -4.0 | 2.3 |
| 5 | 13 | 13.0 | 8.7 | -5.2 | 3.7 |
| 6 | 9 | 22.4 | 15.4 | -3.8 | 4.0 |
| 7 | 8 | 19.0 | 20.9 | -14.9 | 19.3 |
| 8 | 9 | 21.3 | 16.4 | -3.9 | 2.4 |
| 9 | 7 | 20.5 | 11.4 | -4.3 | 3.1 |
| 10 | 14 | 24.8 | 13.0 | -2.6 | 2.3 |

** $p \leq .01$
*** $p \leq .001$

Table 12

Means and Standard Deviations of Number Correct and Discrepancies in Addition by Teacher

| Teacher | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 2 | 6.5 | 0.7 | -4.0*** | 0.4 |
| 2 | 4 | 8.0 | 4.3 | -2.1 | 0.8 |
| 3 | 5 | 4.8 | 2.6 | -4.2 | 2.2 |
| 4 | 8 | 8.0 | 6.7 | -3.2 | 3.3 |
| 5 | 1 | 7.0 | 0.0 | -3.6 | 0.0 |
| 6 | -- | -- | -- | -- | -- |
| 7 | 7 | 15.7 | 14.3 | +0.7 | 2.1 |
| 8 | 2 | 13.0 | 4.2 | -1.1 | 0.1 |
| 9 | 5 | 19.0 | 13.4 | +1.0 | 1.1 |
| 10 | 1 | 2.0 | 0.0 | -11.0 | 0.0 |
| Winter Testing | | | | | |
| 1 | 2 | 23.0 | 0.0 | -1.0 | 0.0 |
| 2 | 3 | 27.7 | 11.6 | -0.2 | 1.9 |
| 3 | 4 | 12.5 | 7.6 | -2.1 | 0.7 |
| 4 | 7 | 19.7 | 11.4 | -1.0 | 1.6 |
| 5 | 1 | 20.0 | 0.0 | -1.7 | 0.0 |
| 6 | -- | -- | -- | -- | -- |
| 7 | 7 | 27.0 | 15.7 | -1.3 | 1.3 |
| 8 | 2 | 17.0 | 8.5 | -0.7 | 2.5 |
| 9 | 5 | 19.2 | 7.4 | -0.9 | 1.2 |
| 10 | 1 | 16.0 | 0.0 | -2.8 | 0.0 |
| Spring Testing | | | | | |
| 1 | 2 | 22.5 | 0.7 | -1.5 | -- |
| 2 | 4 | 24.8 | 8.8 | -0.3 | 1.5 |
| 3 | 5 | 12.2 | 5.5 | -2.7 | 1.6 |
| 4 | 8 | 22.4 | 12.1 | -1.1 | 1.8 |
| 5 | 1 | 26.0 | -- | -1.5 | -- |
| 6 | -- | -- | -- | -- | -- |
| 7 | 7 | 23.3 | 15.2 | -1.4 | 1.4 |
| 8 | 2 | 19.0 | 1.4 | -1.8 | 0.0 |
| 9 | 5 | 28.8 | 8.6 | -0.4 | 1.4 |
| 10 | 1 | 10.0 | -- | -3.1 | 0.7 |

*** $p \leq .001$

Table 13

Means and Standard Deviations of Number Correct and Discrepancies in Subtraction by Teacher

| Teacher | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 2 | 6.5** | 6.4 | -5.9 | 5.8 |
| 2 | 4 | 4.3 | 3.2 | -2.4 | 1.1 |
| 3 | 5 | 4.2 | 3.5 | -2.8 | 0.9 |
| 4 | 8 | 4.3 | 5.0 | -4.1 | 4.6 |
| 5 | 5 | 5.4 | 2.7 | -5.0 | 2.9 |
| 6 | 6 | 5.2 | 1.9 | -4.8 | 3.2 |
| 7 | 7 | 12.0 | 12.3 | -1.3 | 4.9 |
| 8 | 2 | 5.0 | 2.8 | -3.2 | 1.1 |
| 9 | 5 | 20.8 | 15.7 | +0.7 | 1.8 |
| 10 | 9 | 4.7 | 2.1 | -3.4 | 1.8 |
| Winter Testing | | | | | |
| 1 | 2 | 10.0 | 1.4 | -2.7 | 0.4 |
| 2 | 3 | 19.0 | 16.4 | -1.3 | 3.2 |
| 3 | 4 | 8.3 | 6.4 | -3.8 | 2.6 |
| 4 | 7 | 10.6 | 5.5 | -2.6 | 1.6 |
| 5 | 4 | 18.8 | 7.5 | -1.8 | 0.6 |
| 6 | 5 | 19.3 | 5.4 | -2.0 | 0.6 |
| 7 | 7 | 13.3 | 8.2 | -1.9 | 3.4 |
| 8 | 2 | 13.5 | 0.7 | -2.0 | 1.3 |
| 9 | 5 | 16.6 | 8.4 | -0.6 | 1.5 |
| 10 | 8 | 16.9 | 8.0 | -2.0 | 1.7 |
| Spring Testing | | | | | |
| 1 | 2 | 7.0 | 2.8 | -4.1 | 1.6 |
| 2 | 4 | 20.0 | 6.7 | -0.8 | 1.4 |
| 3 | 5 | 12.2 | 8.5 | -1.8 | 1.7 |
| 4 | 8 | 13.0 | 6.5 | -1.6 | 2.1 |
| 5 | 5 | 18.0 | 7.6 | -1.7 | 1.8 |
| 6 | 6 | 12.7 | 5.4 | -2.9 | 1.1 |
| 7 | 7 | 11.9 | 6.3 | -2.7 | 2.1 |
| 8 | 2 | 17.5 | 6.4 | -0.6 | 2.5 |
| 9 | 5 | 17.6 | 10.3 | -1.3 | 1.7 |
| 10 | 8 | 17.9 | 6.8 | -1.6 | 2.5 |

**$p \leq .01$

Table 14

Means and Standard Deviations of Number Correct and Discrepancies in Multiplication by Teacher

| Teacher | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 2 | 3.5 | 3.5 | -23.3 | 23.6 |
| 2 | 3 | 5.3 | 3.2 | -4.5 | 1.9 |
| 3 | 3 | 4.3 | 1.5 | -5.4 | 2.9 |
| 4 | 7 | 7.6 | 7.1 | -3.8 | 4.5 |
| 5 | 4 | 17.5 | 10.2 | -3.9 | 2.5 |
| 6 | 9 | 11.2 | 7.7 | -11.0 | 16.5 |
| 7 | -- | -- | -- | -- | -- |
| 8 | 2 | 15.0 | 8.5 | -0.1 | 2.7 |
| 9 | 3 | 15.7 | 6.4 | -0.4 | 1.5 |
| 10 | 8 | 7.8 | 4.1 | -3.5 | 1.6 |
| Winter Testing | | | | | |
| 1 | 2 | 2.5* | 0.7 | -9.6 | 2.7 |
| 2 | 2 | 35.0 | 5.7 | +1.5 | 0.2 |
| 3 | 2 | 12.5 | 7.8 | -2.8 | 1.9 |
| 4 | 6 | 18.2 | 11.3 | -9.9 | 17.8 |
| 5 | 3 | 39.3 | 3.2 | -1.3 | 1.0 |
| 6 | 8 | 26.6 | 10.7 | -1.0 | 1.6 |
| 7 | -- | -- | -- | -- | -- |
| 8 | 2 | 28.5 | 21.9 | -2.9 | 0.0 |
| 9 | 3 | 30.0 | 23.3 | -2.3 | 4.6 |
| 10 | 7 | 15.3 | 6.9 | -2.7 | 1.3 |
| Spring Testing | | | | | |
| 1 | 2 | 13.0 | 4.2 | +0.0 | 1.8 |
| 2 | 3 | 31.3 | 11.4 | -1.7 | 0.5 |
| 3 | 3 | 8.0 | 6.1 | -8.4 | 4.3 |
| 4 | 7 | 37.7 | 22.3 | -1.6 | 2.8 |
| 5 | 4 | 26.5 | 17.2 | -2.6 | 1.3 |
| 6 | 9 | 40.0 | 8.3 | +0.5 | 1.3 |
| 7 | -- | -- | -- | -- | -- |
| 8 | 2 | 17.0 | 19.8 | -8.8 | 10.2 |
| 9 | 3 | 17.7 | 12.9 | -6.7 | 8.1 |
| 10 | 7 | 21.1 | 19.7 | -3.7 | 5.5 |

*$p \leq .05$

Table 15

Means and Standard Deviations of Number Correct and Discrepancies in Division by Teacher

| Teacher | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 3 | 0.0 | -- | -13.0* | 0.0 |
| 2 | 3 | 0.3 | 0.6 | -4.0 | 0.9 |
| 3 | 3 | 0.0 | -- | -4.0 | 0.9 |
| 4 | 7 | 2.9 | 3.5 | -3.6 | 5.6 |
| 5 | 4 | 0.8 | 1.5 | -8.3 | 3.3 |
| 6 | 9 | 2.7 | 3.1 | -8.9 | 6.1 |
| 7 | -- | -- | -- | -- | -- |
| 8 | 1 | 1.0 | -- | -1.0 | -- |
| 9 | 3 | 3.7 | 3.5 | +1.2 | 5.1 |
| 10 | 2 | 3.0 | 1.4 | -5.3 | 2.5 |
| Winter Testing | | | | | |
| 1 | 3 | 6.7*** | 5.5 | -5.5 | 3.3 |
| 2 | 2 | 7.0 | 1.4 | -2.6 | 0.5 |
| 3 | 2 | 3.0 | 1.4 | -6.5 | 3.5 |
| 4 | 6 | 4.2 | 3.3 | -10.2 | 7.0 |
| 5 | 3 | 37.7 | 15.3 | +0.7 | 1.7 |
| 6 | 8 | 4.0 | 2.3 | -10.8 | 7.8 |
| 7 | -- | -- | -- | -- | -- |
| 8 | 1 | 6.0 | 0 | -5.5 | 0.0 |
| 9 | 3 | 8.3 | 7.4 | -12.3 | 17.9 |
| 10 | 2 | 2.0 | 2.8 | -17.5 | 14.8 |
| Spring Testing | | | | | |
| 1 | 3 | 10.7* | 10.1 | -3.9 | 7.2 |
| 2 | 3 | 15.0 | 8.0 | -2.3 | 1.2 |
| 3 | 3 | 5.3 | 4.5 | -11.3 | 12.1 |
| 4 | 7 | 5.9 | 6.0 | -11.9 | 11.9 |
| 5 | 4 | 33.8 | 7.2 | +0.6 | 1.3 |
| 6 | 9 | 15.6 | 12.7 | -1.6 | 2.9 |
| 7 | -- | -- | -- | -- | -- |
| 8 | 1 | 7.0 | -- | -4.6 | -- |
| 9 | 3 | 14.0 | 18.2 | -4.9 | 5.2 |
| 10 | 2 | 0.0 | 0.0 | -23.0 | 0.0 |

* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$

Table 16

Means and Standard Deviations of Number Correct and Discrepancies in Spelling by Teacher

| Teacher | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 4 | 8 | 51.1 | 28.9 | -2.5* | 2.0 |
| 5 | 9 | 27.1 | 27.8 | -17.1 | 17.0 |
| 6 | 2 | 58.0 | 17.0 | -2.6 | 0.8 |
| 8 | 5 | 22.6 | 7.7 | -2.7 | 1.0 |
| 9 | 5 | 32.2 | 8.2 | -1.7 | 0.4 |
| Winter Testing | | | | | |
| 4 | 8 | 69.4 | 29.9 | -2.3 | 0.8 |
| 5 | 10 | 62.9 | 34.1 | -2.1 | 0.7 |
| 6 | -- | -- | -- | -- | -- |
| 8 | 5 | 84.2 | 19.4 | -1.6 | 0.2 |
| 9 | 5 | 80.6 | 25.7 | -1.8 | 0.7 |
| Spring Testing | | | | | |
| 4 | 8 | 83.6 | 32.1 | -1.9 | 0.6 |
| 5 | 9 | 64.9 | 24.7 | -2.0 | 0.7 |
| 6 | 2 | 116.5 | 55.9 | -1.8 | 0.8 |
| 8 | 5 | 93.8 | 21.6 | -1.8 | 0.8 |
| 9 | 5 | 89.4 | 38.5 | -2.2 | 1.1 |

*$p \leq .05$

Table 17

Frequency of Occasions Where Average Discrepancy Improved Between Fall and Spring for Each Teacher

| Teacher | Reading Passage | Word List | Addition | Subtraction | Multipli-cation | Division | Spelling | Percentage of Reduced Discrepancies |
|---|---|---|---|---|---|---|---|---|
| 1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | -- | 100 |
| 2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | -- | 100 |
| 3 | ✓ | ✓ | ✓ | ✓ | | | -- | 66 |
| 4 | | ✓ | ✓ | ✓ | ✓ | | ✓ | 71 |
| 5 | ✓ | -- | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| 6 | | -- | -- | ✓ | ✓ | ✓ | ✓ | 80 |
| 7 | | | | | -- | -- | -- | 0 |
| 8 | ✓ | ✓ | | ✓ | | | ✓ | 57 |
| 9 | | | | | | | | 0 |
| 10 | ✓ | ✓ | ✓ | ✓ | | | -- | 66 |

✓ signifies that peer discrepancy decreased between Fall and Spring test session.
-- denotes no comparison possible.

Table 18

F-ratios, Degrees of Freedom, and Probability Levels for ANOVA on Classification of Students

| Measures | Fall Testing | | Winter Testing | | Spring Testing | |
|---|---|---|---|---|---|---|
| | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies |
| Passages | $F = 7.76$ $(1,94)$ $p \leq .01$ | $F = 5.73$ $(1,94)$ $p \leq .05$ | $F = 6.64$ $(1.94)$ $p \leq .05$ | X | $F = 10.98$ $(1,94)$ $p \leq .001$ | X |
| Word Lists | X | X | X | X | $F = 7.21$ $(1,93)$ $p \leq .01$ | X |
| Addition | $F = 4.00$ $(1,33)$ $p \leq .05$ | $F = 4.27$ $(1,33)$ $p \leq 0.5$ | X | $F = 8.78$ $(1,31)$ $p \leq .01$ | $F = 13.13$ $(1,33)$ $p \leq .001$ | $F = 16.75$ $(1,33)$ $p \leq .001$ |
| Subtraction | X | X | $F = 5.77$ $(1,44)$ $p \leq .05$ | $F = 9.28$ $(1,47)$ $p \leq .01$ | X | X |
| Multiplication | X | X | X | X | $F = 6.71$ $(1,39)$ $p \leq .01$ | $F = 5.10$ $(1,39)$ $p \leq .05$ |
| Division | $F = 6.1$ $(1,33)$ $p \leq .05$ | X | X | X | X | X |
| Spelling | X | $F = 5.15$ $(1,28)$ $p \leq .05$ | X | X | X | X |

Table 19

Means and Standard Deviations of Number Correct and Discrepancies in Reading Measures for Each Student Classification

| Student Classification | N | Average Median Correct | Standard Deviation Median Correct | Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| LD: | | | | | |
| Reading Passages | 55 | 42.9** | 31.6 | -3.5* | 4.6 |
| Word Lists | 36 | 10.5 | 10.1 | -5.0 | 4.3 |
| EMR: | | | | | |
| Reading Passages | 41 | 26.6 | 23.2 | -7.0 | 9.2 |
| Word Lists | 23 | 8.0 | 8.5 | -7.3 | 6.4 |
| Winter Testing | | | | | |
| LD: | | | | | |
| Reading Passages | 55 | 54.6* | 28.6 | -2.8 | 2.4 |
| Word Lists | 36 | 15.3 | 11.8 | -5.1 | 4.4 |
| EMR: | | | | | |
| Reading Passages | 41 | 40.2 | 24.5 | -3.8 | 3.6 |
| Word Lists | 20 | 15.7 | 12.9 | -5.7 | 5.2 |
| Spring Testing | | | | | |
| LD: | | | | | |
| Reading Passages | 55 | 60.8*** | 29.8 | -3.4 | 5.0 |
| Word Lists | 55 | 21.8** | 12.8 | -3.9 | 6.0 |
| EMR: | | | | | |
| Reading Passages | 41 | 41.5 | 26.2 | -3.9 | 2.7 |
| Word Lists | 41 | 14.8 | 12.2 | -6.5 | 7.4 |

* $p \leq .05$
** $p \leq .01$
***$p \leq .001$

Table 20

Means and Standard Deviations of Number Correct and Discrepancies in Math for Each Student Classification

| | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| **Addition** | | | | | |
| **Fall Testing** | | | | | |
| LD | 16 | 14.1* | 12.1 | -0.8* | 2.9 |
| EMR | 19 | 7.7 | 6.3 | -3.0 | 3.2 |
| **Winter Testing** | | | | | |
| LD | 15 | 24.5 | 11.7 | -0.5** | 1.4 |
| EMR | 18 | 18.3 | 10.0 | -1.7 | 1.0 |
| **Spring Testing** | | | | | |
| LD | 16 | 28.1*** | 11.5 | -0.4*** | 1.5 |
| EMR | 19 | 16.6 | 7.0 | -2.1 | 1.0 |
| **Subtraction** | | | | | |
| **Fall Testing** | | | | | |
| LD | 28 | 7.8 | 9.9 | -2.9 | 3.7 |
| EMR | 25 | 6.6 | 6.3 | -3.3 | 3.2 |
| **Winter Testing** | | | | | |
| LD | 26 | 17.2* | 8.0 | -1.3** | 1.7 |
| EMR | 23 | 11.9 | 6.8 | -2.9 | 2.0 |
| **Spring Testing** | | | | | |
| LD | 28 | 16.3 | 7.3 | -1.6 | 1.9 |
| EMR | 25 | 13.5 | 7.0 | -2.2 | 1.9 |
| **Multiplication** | | | | | |
| **Fall Testing** | | | | | |
| LD | 25 | 10.4 | 6.8 | -5.5 | 10.6 |
| EMR | 16 | 8.8 | 8.0 | -6.9 | 9.4 |
| **Winter Testing** | | | | | |
| LD | 23 | 23.7 | 13.0 | -2.2 | 2.7 |
| EMR | 14 | 19.7 | 15.4 | -6.3 | 11.9 |
| **Spring Testing** | | | | | |
| LD | 25 | 32.7** | 15.7 | -1.6* | 3.5 |
| EMR | 16 | 18.9 | 18.0 | -4.8 | 5.7 |
| **Division** | | | | | |
| **Fall Testing** | | | | | |
| LD | 19 | 2.8* | 3.1 | -5.7 | 6.4 |
| EMR | 16 | .8 | 1.4 | -6.4 | 4.6 |
| **Winter Testing** | | | | | |
| LD | 18 | 5.5 | 3.6 | -7.9 | 6.6 |
| EMR | 14 | 11.1 | 16.0 | -9.5 | 10.6 |
| **Spring Testing** | | | | | |
| LD | 19 | 13.4 | 11.7 | -3.4 | 6.3 |
| EMR | 16 | 12.7 | 14.0 | -6.7 | 9.3 |

* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$

Table 21

Means and Standard Deviations of Number Correct and Discrepancies in Spelling for Each Student Classification

| Student Classification | N | Average Median Correct | Standard Deviation Median Correct | Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| LD | 14 | 44.1 | 23.4 | -2.1* | 1.2 |
| EMR | 16 | 30.6 | 25.2 | -10.9 | 14.4 |
| Winter Testing | | | | | |
| LD | 12 | 76.8 | 28.2 | -2.0 | 0.7 |
| EMR | 16 | 67.9 | 30.1 | -2.0 | 0.7 |
| Spring Testing | | | | | |
| LD | 14 | 92.9 | 33.9 | -2.0 | 0.8 |
| EMR | 16 | 74.8 | 28.0 | -2.0 | 0.6 |

*$p \leq .05$

Table 22

F-ratios, Degrees of Freedom, and Probability Levels for ANOVA on Grade Level of Students

| Measures | Fall Testing | | Winter Testing | | Spring Testing | |
|---|---|---|---|---|---|---|
| | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies |
| Passages | F = 19.33 (5,90) $p \leq .001$ | F = 9.54 (5,90) $p \leq .001$ | F = 21.3 (5,90) $p \leq .001$ | F = 8.34 (5,90) $p \leq .001$ | F = 15.64 (5,90) $p \leq .001$ | F = 6.82 (5,90) $p \leq .001$ |
| Word Lists | F = 4.67 (5,52) $p \leq .001$ | X | F = 2.87 (5,50) $p \leq .05$ | X | F = 5.58 (5,89) $p \leq .001$ | F = 3.18 (5,90) $p \leq .01$ |
| Addition | F = 3.33 (5,29) $p \leq .05$ | F = 3.14 (5.29) $p \leq .05$ | X | X | X | X |
| Subtraction | F = 3.26 (5,47) $p \leq .05$ | X | X | F = 3.01 (5,43) $P \leq .05$ | X | X |
| Multiplication | F = 3.16 (2,38) $p \leq .05$ | X | X | X | F = 3.93 (2,38) $p \leq .05$ | X |
| Division | X | X | X | X | X | F = 7.39 (2,32) $p \leq .01$ |
| Spelling | F = 9.14 (4,25) $p \leq .001$ | F = 743.53 (4,25) $p \leq .001$ | F = 7.70 (4,23) $p \leq .001$ | X | F = 5.15 (4,25) $p \leq .001$ | X |

Table 23

Means and Standard Deviations of Number Correct and Discrepancies in Reading Passages for all Six Grade Levels

| Grade Level | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 5 | 6.8*** | 7.8 | -1.2*** | 4.5 |
| 2 | 13 | 5.5 | 6.5 | -14.7 | 12.8 |
| 3 | 17 | 20.5 | 12.4 | -6.3 | 7.4 |
| 4 | 22 | 31.0 | 15.4 | -3.7 | 2.0 |
| 5 | 18 | 59.1 | 32.8 | -1.8 | 1.2 |
| 6 | 21 | 59.5 | 25.4 | -2.9 | 2.2 |
| Winter Testing | | | | | |
| 1 | 6 | 14.3*** | 7.3 | -5.3*** | 4.3 |
| 2 | 13 | 16.2 | 8.1 | -6.9 | 5.2 |
| 3 | 17 | 36.6 | 17.4 | -3.3 | 1.6 |
| 4 | 22 | 50.3 | 18.4 | -2.4 | 0.9 |
| 5 | 17 | 72.9 | 26.4 | -1.7 | 0.9 |
| 6 | 21 | 65.9 | 21.6 | -2.4 | 2.1 |
| Spring Testing | | | | | |
| 1 | 5 | 9.6*** | 3.8 | -10.3*** | 5.8 |
| 2 | 13 | 23.6 | 16.0 | -6.9 | 8.2 |
| 3 | 17 | 41.3 | 15.9 | -3.4 | 1.5 |
| 4 | 22 | 52.9 | 23.3 | -2.8 | 2.0 |
| 5 | 18 | 79.1 | 33.0 | -2.3 | 2.4 |
| 6 | 21 | 66.8 | 20.1 | -2.3 | 1.0 |

*** $p \leq .001$

Table 24

Means and Standard Deviations of Number Correct and Discrepancies in Reading Word Lists for Each of Six Grades

| Grade Level | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 3 | 0.0*** | 0.0 | -2.2 | 3.3 |
| 2 | 9 | 4.2 | 3.6 | -6.5 | 7.2 |
| 3 | 14 | 6.2 | 4.9 | -6.6 | 4.7 |
| 4 | 15 | 9.0 | 11.1 | -7.9 | 5.9 |
| 5 | 11 | 16.7 | 10.7 | -3.8 | 2.3 |
| 6 | 7 | 16.6 | 8.3 | -4.5 | 5.6 |
| Winter Testing | | | | | |
| 1 | 5 | 10.0* | 16.8 | -4.0 | 1.7 |
| 2 | 8 | 14.0 | 11.3 | -7.3 | 7.3 |
| 3 | 15 | 9.7 | 6.1 | -7.1 | 5.5 |
| 4 | 10 | 13.9 | 12.9 | -5.2 | 2.8 |
| 5 | 11 | 22.5 | 12.0 | -2.9 | 1.3 |
| 6 | 7 | 24.3 | 11.4 | -4.2 | 5.0 |
| Spring Testing | | | | | |
| 1 | 5 | 4.2*** | 3.8 | -15.1** | 16.6 |
| 2 | 13 | 10.2 | 5.5 | -4.9 | 3.8 |
| 3 | 17 | 16.8 | 14.0 | -6.2 | 10.3 |
| 4 | 22 | 17.2 | 10.1 | -4.6 | 2.8 |
| 5 | 18 | 27.2 | 13.7 | -3.3 | 3.7 |
| 6 | 21 | 23.2 | 12.5 | -3.5 | 3.7 |

*$p \leq .05$
** $p \leq .01$
*** $p \leq .001$

Table 25

Means and Standard Deviations of Number Correct and Discrepancies in Addition for Each of Six Grade Levels

| Grade Level | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 3 | 2.3* | 0.6 | -1.3* | 4.9 |
| 2 | 4 | 4.0 | 2.3 | -1.8 | 2.3 |
| 3 | 8 | 18.1 | 10.5 | +0.7 | 1.4 |
| 4 | 3 | 4.0 | 3.5 | -6.0 | 4.8 |
| 5 | 8 | 7.5 | 4.6 | -3.5 | 2.7 |
| 6 | 9 | 14.8 | 11.9 | -2.0 | 2.7 |
| Winter Testing | | | | | |
| 1 | 3 | 21.3 | 25.0 | -1.9 | 0.6 |
| 2 | 4 | 17.5 | 16.0 | -1.2 | 2.1 |
| 3 | 8 | 23.4 | 10.0 | -0.9 | 1.3 |
| 4 | 3 | 14.3 | 2.9 | -2.1 | 0.6 |
| 5 | 7 | 24.0 | 8.3 | -0.7 | 1.3 |
| 6 | 7 | 20.0 | 7.3 | -1.3 | 1.3 |
| Spring Testing | | | | | |
| 1 | 3 | 9.3 | 4.9 | -2.1 | 1.0 |
| 2 | 4 | 21.5 | 11.4 | -0.5 | 1.9 |
| 3 | 8 | 25.3 | 12.4 | -1.5 | 1.2 |
| 4 | 4 | 20.8 | 14.1 | -1.6 | 2.2 |
| 5 | 8 | 21.6 | 9.0 | -0.9 | 1.4 |
| 6 | 8 | 24.1 | 10.0 | -1.6 | 1.8 |

* $p \leq .05$

Table 26

Means and Standard Deviations of Number Correct and Discrepancies in Subtraction for Each of Six Grade Levels

| Grade Level | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 1 | 3 | 1.7* | 0.6 | -0.3 | 2.9 |
| 2 | 5 | 2.8 | 3.1 | -4.5 | 5.7 |
| 3 | 10 | 14.4 | 9.2 | -1.2 | 2.7 |
| 4 | 8 | 3.4 | 2.5 | -3.2 | 1.5 |
| 5 | 11 | 4.7 | 3.1 | -3.9 | 3.6 |
| 6 | 16 | 8.8 | 10.8 | -3.9 | 3.3 |
| Winter Testing | | | | | |
| 1 | 3 | 3.7 | 5.5 | -5.0* | 5.4 |
| 2 | 5 | 15.9 | 12.4 | -0.9 | 2.3 |
| 3 | 10 | 17.1 | 6.1 | -1.2 | 0.9 |
| 4 | 9 | 12.9 | 8.6 | -2.5 | 2.0 |
| 5 | 9 | 13.0 | 4.1 | -2.0 | 1.0 |
| 6 | 13 | 16.9 | 7.1 | -2.2 | 1.3 |
| Spring Testing | | | | | |
| 1 | 3 | 6.3 | 4.5 | -3.4 | 3.1 |
| 2 | 5 | 19.0 | 7.2 | -1.1 | 1.6 |
| 3 | 10 | 13.5 | 5.0 | -1.9 | 1.3 |
| 4 | 9 | 18.3 | 7.8 | -1.0 | 1.9 |
| 5 | 11 | 13.5 | 5.9 | -1.7 | 1.7 |
| 6 | 15 | 15.3 | 8.2 | -2.5 | 2.1 |

* $p \leq .05$

Table 27

Means and Standard Deviations of Number Correct and Discrepancies in Multiplication for Each of Three Grades

| Grade Level | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 4 | 10 | 7.4* | 6.1 | -3.5 | 4.1 |
| 5 | 9 | 6.2 | 3.6 | -3.6 | 2.4 |
| 6 | 22 | 12.2 | 8.1 | -8.1 | 13.1 |
| Winter Testing | | | | | |
| 4 | 10 | 16.8 | 17.1 | -7.5 | 13.1 |
| 5 | 7 | 26.7 | 7.6 | -0.9 | 1.7 |
| 6 | 19 | 23.3 | 13.7 | -2.6 | 3.2 |
| Spring Testing | | | | | |
| 4 | 11 | 16.2* | 10.7 | -4.3 | 4.0 |
| 5 | 9 | 36.3 | 20.9 | -2.3 | 3.9 |
| 6 | 21 | 29.2 | 17.1 | -2.3 | 5.3 |

* $p \leq .05$

Table 28

Means and Standard Deviations of Number Correct and Discrepancies in Division for Each of Three Grade Levels

| Grade Level | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 4 | 3 | 3.0 | 2.6 | -0.9 | 2.4 |
| 5 | 8 | 1.3 | 3.2 | -3.7 | 2.3 |
| 6 | 24 | 2.0 | 2.6 | -7.4 | 6.1 |
| Winter Testing | | | | | |
| 4 | 4 | 5.3 | 5.5 | -7.9 | 10.2 |
| 5 | 7 | 5.1 | 3.0 | -6.8 | 3.9 |
| 6 | 21 | 9.4 | 13.3 | -9.3 | 9.5 |
| Spring Testing | | | | | |
| 4 | 4 | 8.0 | 7.9 | -7.5** | 8.2 |
| 5 | 8 | 6.9 | 7.6 | -12.3 | 11.8 |
| 6 | 23 | 16.1 | 13.8 | -1.9 | 3.5 |

** $p \leq .01$

Table 29

Means and Standard Deviations of Number Correct and Discrepancies in Spelling for Each of Five Grade Levels

| Grade Level | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| 2 | 4 | 0.0*** | 0.0 | -35.0*** | 0.0 |
| 3 | 2 | 18.0 | 2.8 | -3.0 | 1.8 |
| 4 | 7 | 30.1 | 14.7 | -3.0 | 1.6 |
| 5 | 7 | 60.0 | 25.4 | -1.3 | 1.1 |
| 6 | 10 | 44.0 | 15.5 | -2.7 | 0.8 |
| Winter Testing | | | | | |
| 2 | 4 | 29.5*** | 5.1 | -2.3 | 0.4 |
| 3 | 2 | 59.0 | 21.2 | -2.2 | 0.8 |
| 4 | 7 | 65.7 | 21.0 | -2.1 | 0.7 |
| 5 | 7 | 98.7 | 22.6 | -1.6 | 0.5 |
| 6 | 8 | 77.6 | 22.5 | -2.1 | 0.8 |
| Spring Testing | | | | | |
| 2 | 4 | 43.8*** | 8.1 | -1.9 | 0.6 |
| 3 | 2 | 64.0 | 11.3 | -2.2 | 0.4 |
| 4 | 7 | 75.7 | 27.7 | -2.0 | 0.6 |
| 5 | 7 | 111.3 | 19.2 | -1.5 | 0.3 |
| 6 | 10 | 88.6 | 31.3 | -2.3 | 0.9 |

*** $p \leq .001$

Table 30

F-ratios, Degrees of Freedom, and Probability Levels for ANOVA on Student Sex

| Measures | Fall Testing | | Winter Testing | | Spring Testing | |
|---|---|---|---|---|---|---|
| | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies | Mdn Correct | Discrepancies |
| Passages | X | X | X | X | X | X |
| Word Lists | $F = 3.87$ $(1,56)$ $p \leq .05$ | X | X | X | X | X |
| Addition | X | X | X | X | X | X |
| Subtraction | X | X | X | X | X | X |
| Multiplication | X | X | X | X | X | X |
| Division | X | X | X | $F = 4.42$ $(1,30)$ $p \leq .05$ | X | X |
| Spelling | X | X | X | X | X | X |

Table 31

Means and Standard Deviations of Number Correct and Discrepancies in Reading by Sex of Student

| Sex | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| Reading Passages: | | | | | |
| Girls | 15 | 48.1 | 28.9 | -2.5 | 2.5 |
| Boys | 81 | 33.7 | 29.0 | -5.5 | 7.5 |
| Word Lists: | | | | | |
| Girls | 9 | 15.5* | 10.6 | -3.9 | 4.1 |
| Boys | 50 | 8.5 | 9.1 | -6.3 | 5.4 |
| Winter Testing | | | | | |
| Reading Passages: | | | | | |
| Girls | 15 | 58.0 | 27.9 | -2.3 | 1.3 |
| Boys | 81 | 46.7 | 27.5 | -3.4 | 3.2 |
| Word Lists: | | | | | |
| Girls | 10 | 20.1 | 13.1 | -3.6 | 2.7 |
| Boys | 46 | 14.4 | 11.8 | -5.7 | 4.9 |
| Spring Testing | | | | | |
| Reading Passages: | | | | | |
| Girls | 15 | 62.3 | 33.8 | -3.5 | 4.7 |
| Boys | 81 | 50.8 | 28.9 | -3.7 | 4.0 |
| Word Lists: | | | | | |
| Girls | 15 | 22.6 | 16.3 | -6.1 | 10.8 |
| Boys | 81 | 18.1 | 12.2 | -4.8 | 5.7 |

Table 32

Means and Standard Deviations of Number Correct and Discrepancies in Math by Sex of Student

| Sex | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| **Addition** | | | | | |
| Fall Testing | | | | | |
| Girls | 11 | 12.3 | 10.9 | -1.6 | 2.3 |
| Boys | 24 | 9.9 | 9.4 | -2.2 | 3.6 |
| Winter Testing | | | | | |
| Girls | 10 | 21.8 | 10.4 | -1.0 | 1.3 |
| Boys | 23 | 20.6 | 11.5 | -1.3 | 1.4 |
| Spring Testing | | | | | |
| Girls | 11 | 24.5 | 10.9 | -1.0 | 1.2 |
| Boys | 24 | 20.7 | 10.8 | -1.5 | 1.7 |
| **Subtraction** | | | | | |
| Fall Testing | | | | | |
| Girls | 15 | 8.3 | 6.4 | -2.1 | 1.9 |
| Boys | 37 | 6.8 | 9.1 | -3.5 | 3.9 |
| Winter Testing | | | | | |
| Girls | 15 | 15.7 | 6.6 | -1.7 | 1.5 |
| Boys | 34 | 14.2 | 8.4 | -2.2 | 2.2 |
| Spring Testing | | | | | |
| Girls | 15 | 13.9 | 5.5 | -2.0 | 1.3 |
| Boys | 36 | 15.4 | 7.9 | -1.8 | 2.2 |
| **Multiplication** | | | | | |
| Fall Testing | | | | | |
| Girls | 11 | 8.8 | 5.2 | -6.8 | 11.1 |
| Boys | 30 | 10.1 | 7.9 | -5.7 | 9.8 |
| Winter Testing | | | | | |
| Girls | 9 | 14.9 | 13.4 | -4.5 | 3.9 |
| Boys | 28 | 24.6 | 13.5 | -3.5 | 8.7 |
| Spring Testing | | | | | |
| Girls | 12 | 27.4 | 20.6 | -3.9 | 5.6 |
| Boys | 29 | 27.2 | 16.9 | -2.4 | 4.3 |
| **Division** | | | | | |
| Fall Testing | | | | | |
| Girls | 10 | 1.6 | 3.0 | -7.4 | 6.3 |
| Boys | 25 | 2.0 | 2.6 | -5.4 | 5.3 |
| Winter Testing | | | | | |
| Girls | 8 | 3.0 | 2.0 | -13.8* | 11.0 |
| Boys | 24 | 9.8 | 12.5 | -6.9 | 6.9 |
| Spring Testing | | | | | |
| Girls | 10 | 11.1 | 11.8 | -6.3 | 8.4 |
| Boys | 25 | 13.9 | 13.1 | -4.4 | 7.7 |

* $p \leq .05$

Table 33

Means and Standard Deviations of Number Correct and Discrepancies in Spelling by Sex of Student

| Sex | N | Average Median Correct | Standard Deviation Median Correct | Average Discrepancy | Standard Deviation Average Discrepancy |
|---|---|---|---|---|---|
| Fall Testing | | | | | |
| Girls | 4 | 48.5 | 20.2 | -2.2 | 1.4 |
| Boys | 26 | 35.1 | 25.5 | -7.5 | 12.0 |
| Winter Testing | | | | | |
| Girls | 4 | 83.0 | 27.1 | -2.0 | 1.0 |
| Boys | 24 | 69.8 | 29.5 | -2.0 | 0.6 |
| Spring Testing | | | | | |
| Girls | 4 | 99.5 | 36.1 | -1.9 | 1.1 |
| Boys | 26 | 80.8 | 31.0 | -2.0 | 0.6 |

## PUBLICATIONS

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